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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. ^{RM} |
|-----------------|-------------|----------------------|-----------------------------------|

12/13/00
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| EXAMINER |
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| ART UNIT | PAPER NUMBER |
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DATE MAILED:

5
12/13/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/365,978

Applicant(s)

HEFTI, JOHN

Examiner

Minh-Quan K. Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Drawings

This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-33 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the connectivity relationship between the signal path, the measurement system and the computer.

Claims 2-12 recite the limitation "The single path test system" in lines 1 of each claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Weiss (US 5,858,666) or Hollis et al. (US 5,653,939), each in view of Hollis et al. (1980), *IEEE Transaction on Microwave Theory and Techniques*, MTT-28(7):791-801.

Weiss disclose an apparatus using AC signals conducted through transmission lines to detect binding reactions at fixed locations on the signal path (see column 1, lines 40-67). The binding reactions can be antibody/antigen, enzyme/substrate, complementary DNAs, etc. (see column 3, line 62 to column 4, line 20; and Figures 4 and 7-9).

Hollis et al. (US 5,653,939) disclose a method for identifying molecules in a sample using a monolithic array of test sites form on a substrate upon which the sample is applied. The test sites include probes, such as DNA or antibody, for binding a target molecule. A signal is applied to the test sites and certain electrical, mechanical, and/or optical properties of the test sites are detected to determine the binding of the assay to the probe (see abstract; column 2, lines 30-38 and lines 59-67; column 3, lines 1-8; column 4, lines 50-63; column 6, lines 36-67; column 7; column 8, lines 1-58; and column 18, lines 24-63).

Weiss et al. or Hollis et al., however, differ from the claimed invention because they do not disclose the specific frequencies used in the detection.

Hollis et al. (1980) disclose dielectric characterization of chemical and biological system using frequencies of 0.1-2 GHz.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use test signals in the microwave range, as taught by Hollis et al. (1980),

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in the apparatus of Weiss et al. or Hollis et al (US 5,653,939), because the microwave frequencies has the advantages of 1) being "simple and rapid, which enables among other things the study of time varying processes", 2) containing inexpensive equipment, 3) requiring small volume (see Hollis et al. (1980), page 800, column 2). Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a vector network analyzer because these instrument are well known and widely used in the art to measure transmission and reflection characteristics of active and passive devices. These instruments are efficient in measuring parameters such as deviation from linear phase, group delay, complex impedance, return loss, gain drift, etc. Vector network analyzers are also available commercially, i.e., HP 8720C, HP 8510B, HP 8510XF, etc.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure

Newman (U.S. 4,822,566), Hafeman et al. (U.S. 5,164,319), and Shieh et al. (U.S. 5,827,482) are cited to show methods of analyte detection using changes in electrical properties.

Eggers et al.(1994), *BioTechniques*, 17(3):516-523, is cited to show analyte detection in an array using a charge-couple device detector.

Simon (U.S. 5,846,843), Kornguth et al. (U.S. 5,629,213), Yee et al. (U.S. 5,822,073 and 5,858,799), Nelson et al. (U.S. 5,955,729), Karlson et al. (U.S. 5,991,048), Bender et al. (U.S. 5,327,225), Foster (U.S. 5,485,277), and Seher (U.S. 5,341,215) are cited to show analyte detection using surface plasmon resonance (SPR).

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Malmqvist et al. (U.S. 5,965,456); Tosa (U.S. 5,869,261); Herron et al. (U.S. 5,846,842; 5,919,712; and 5,512,492); Reichert et al. (U.S. 5,961,924 and 5,832,165); Cook et al. (U.S. 5,738,992); Hale et al. (U.S. 5,532,493); Stimpson et al. (U.S. 5,843,651); Jorgenson et al. (U.S. 5,647,030 and 5,835,645); Partin et al. (U.S. 5,082,630); Slovacek et al. (U.S. 5,340,715); Ferguson et al. (1996), *Nature Biotechnology*, 14:1681-1684; Attridge et al. (U.S. 5,478,755); Stimpson et al. (1995), *Proceedings of the National Academy of Sciences USA*, 92:6379-6383 are cited to show analyte detection using wave guides including fiber optics.

Frutos et al. (1998), *Analytical Chemistry News & Features*, July 1, 1998, p. 449A-455A.; and Hanken et al. (1997), *Analytical Chemistry*, 69(18):3665-3673, are cited to show electrochemically modulated-SPR.

Ribi (U.S. 5,156,810) and Eggers et al. (U.S. 5,532,128) are cited to show analyte detection using arrays and electrical properties.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh-Quan K. Pham whose telephone number is (703) 305-1444. The examiner can normally be reached on Monday to Friday, 8 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (703) 305-3399. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-4242 for regular communications and (703) 308-4242 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

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Minh-Quan K. Pham, Ph.D.
December 5, 2000



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PRIMARY EXAMINER
GROUP ~~1800~~ 1641